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(54) Abstract Title
Communicating relative position of telecommunication subscribers within a predetermined area

(57) Method and apparatus enabling a first subscriber of a telecommunication system to determine his position relative to that of another subscriber within a given range, by notifying the first subscriber of the presence and position of another subscriber within a predetermined area. The method obtains positional data for a first mobile communication device associated with a first subscriber to the system and positional data for a second subscriber to the system. The presence of the second subscriber within a predetermined area of the first device and the position of the second subscriber relative to the position of the first device are determined and a signal indicating the position of the second subscriber relative to the first device is transmitted to the first device, for display. The apparatus of the invention has means for storing data indicative of subscriber position, means for receiving data indicative of subscriber position, means for detecting the presence and position of a subscriber within a predetermined area of another subscriber and means for transmitting a signal representative of positional information indicating the relative position of the subscribers within the predetermined area. One of the subscribers may be a stationary facility such as a shop and the transmitted information may be displayed graphically, for example on a radar-style display. The range may be pre-set by the subscriber or vary according to the density of subscriber targets. Subscribers may have the option of deciding if their position is displayed and may choose whether or not to display the positions of others.

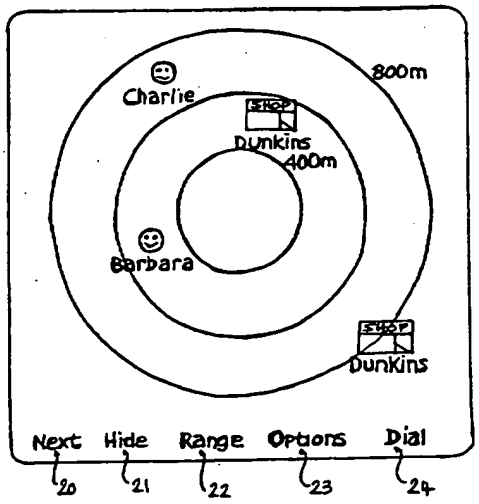

FIG 4

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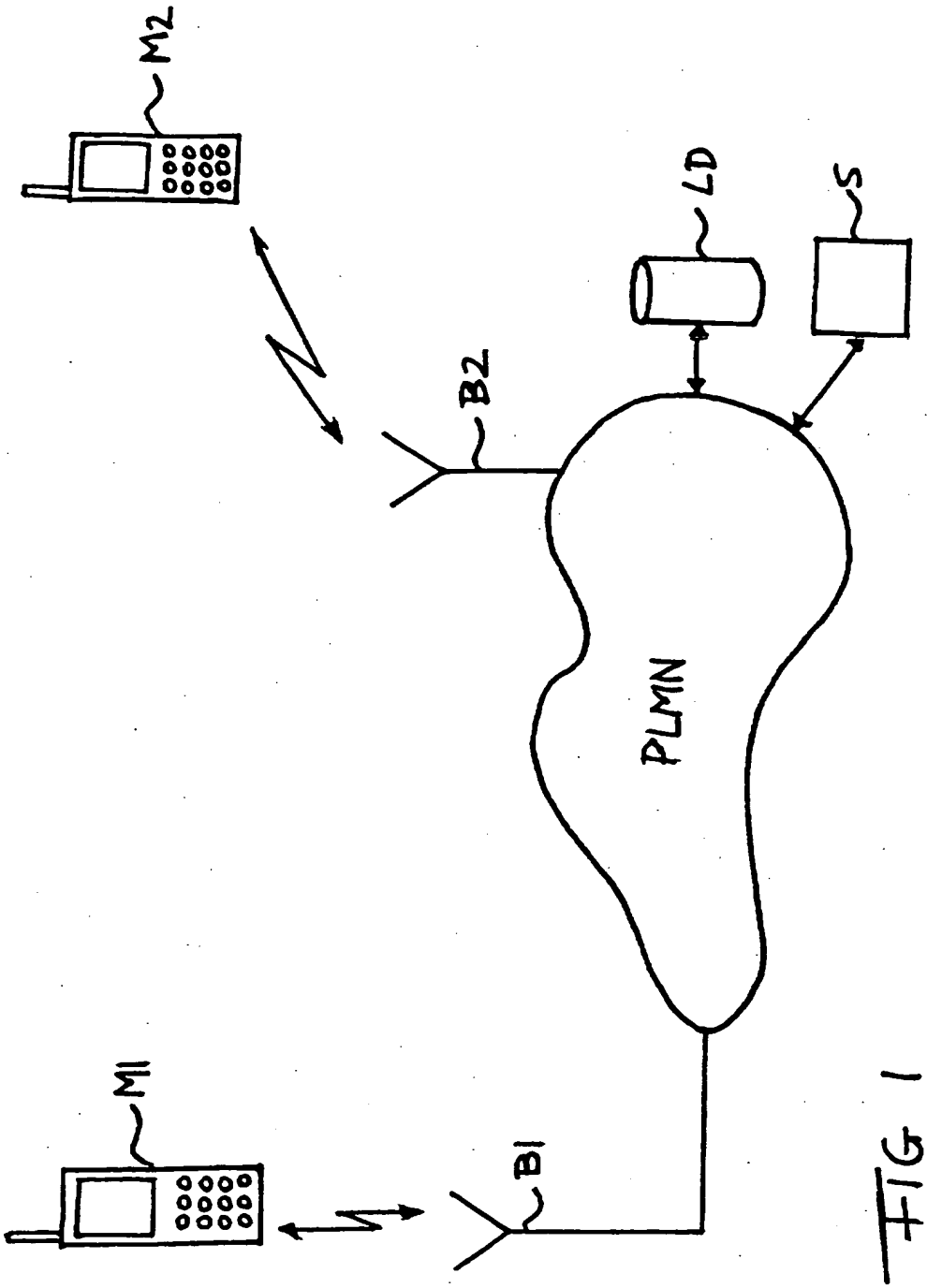

FIG 1

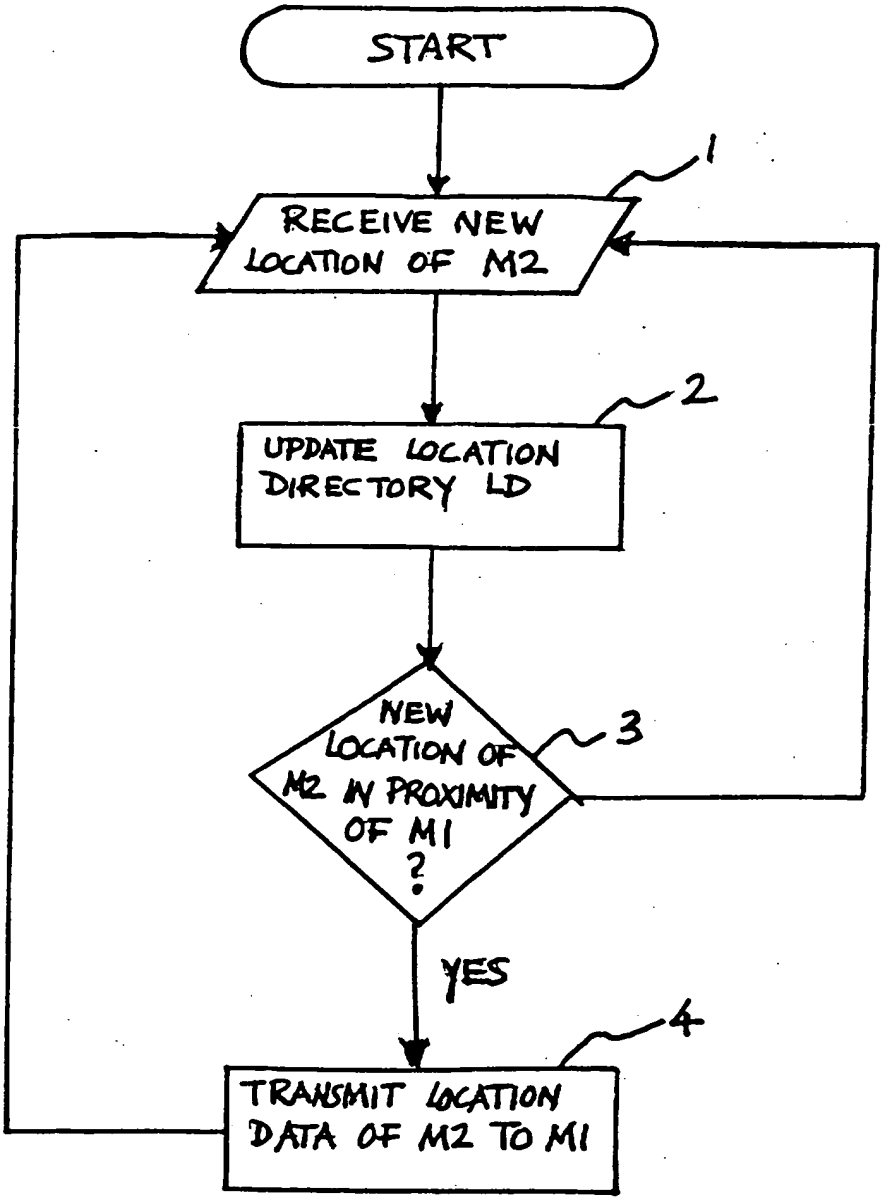

FIG 2

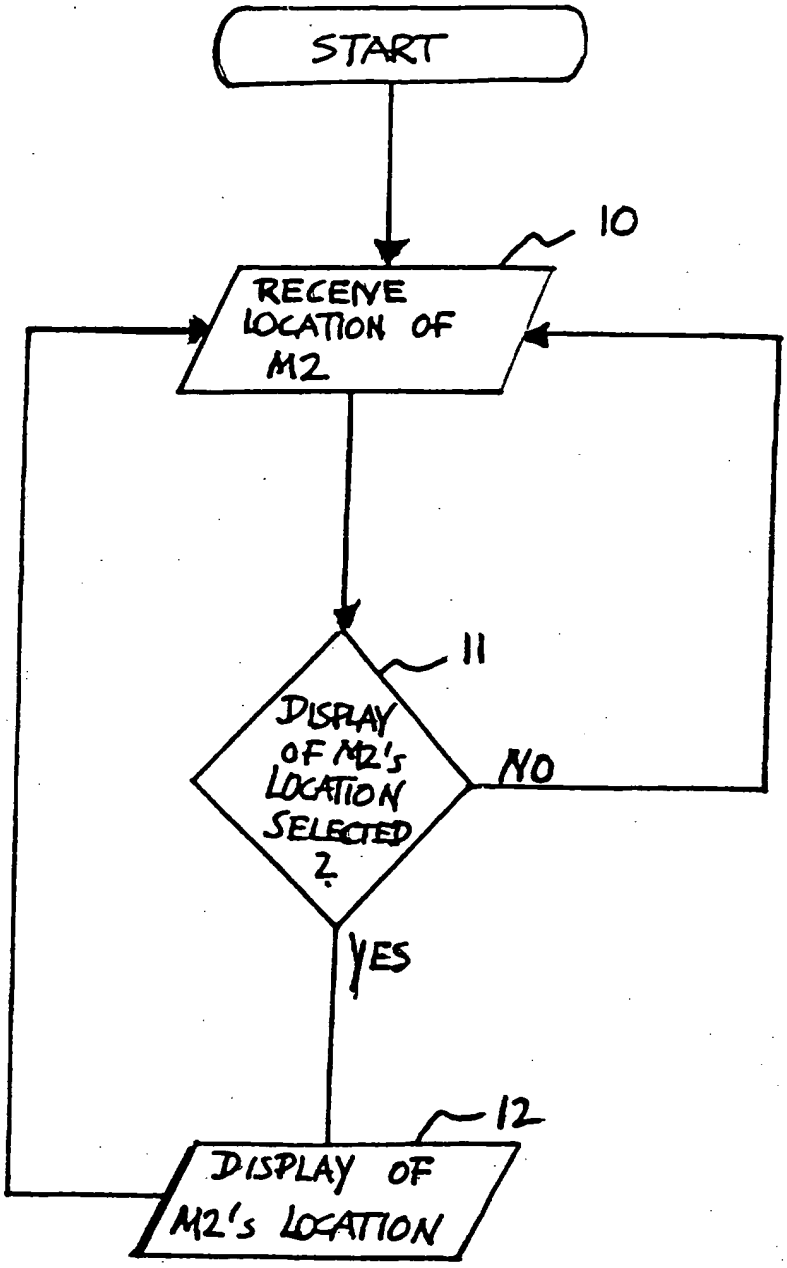
START
10
RECEIVE LOCATION OF M2
11
DISPLAY OF M2's LOCATION SELECTED ?
NO
YES
12
DISPLAY OF M2's LOCATION

FIG 3

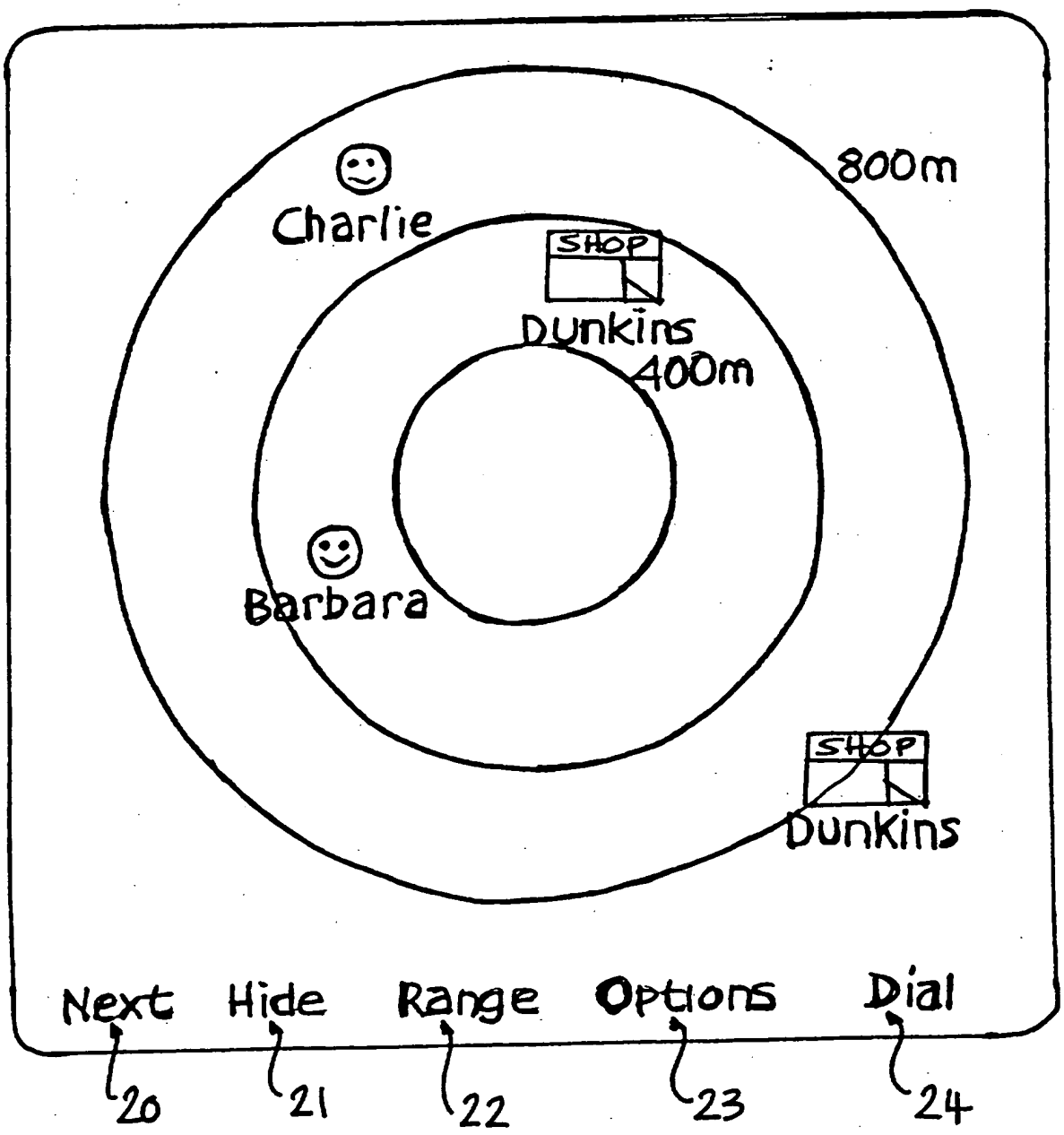

FIG 4

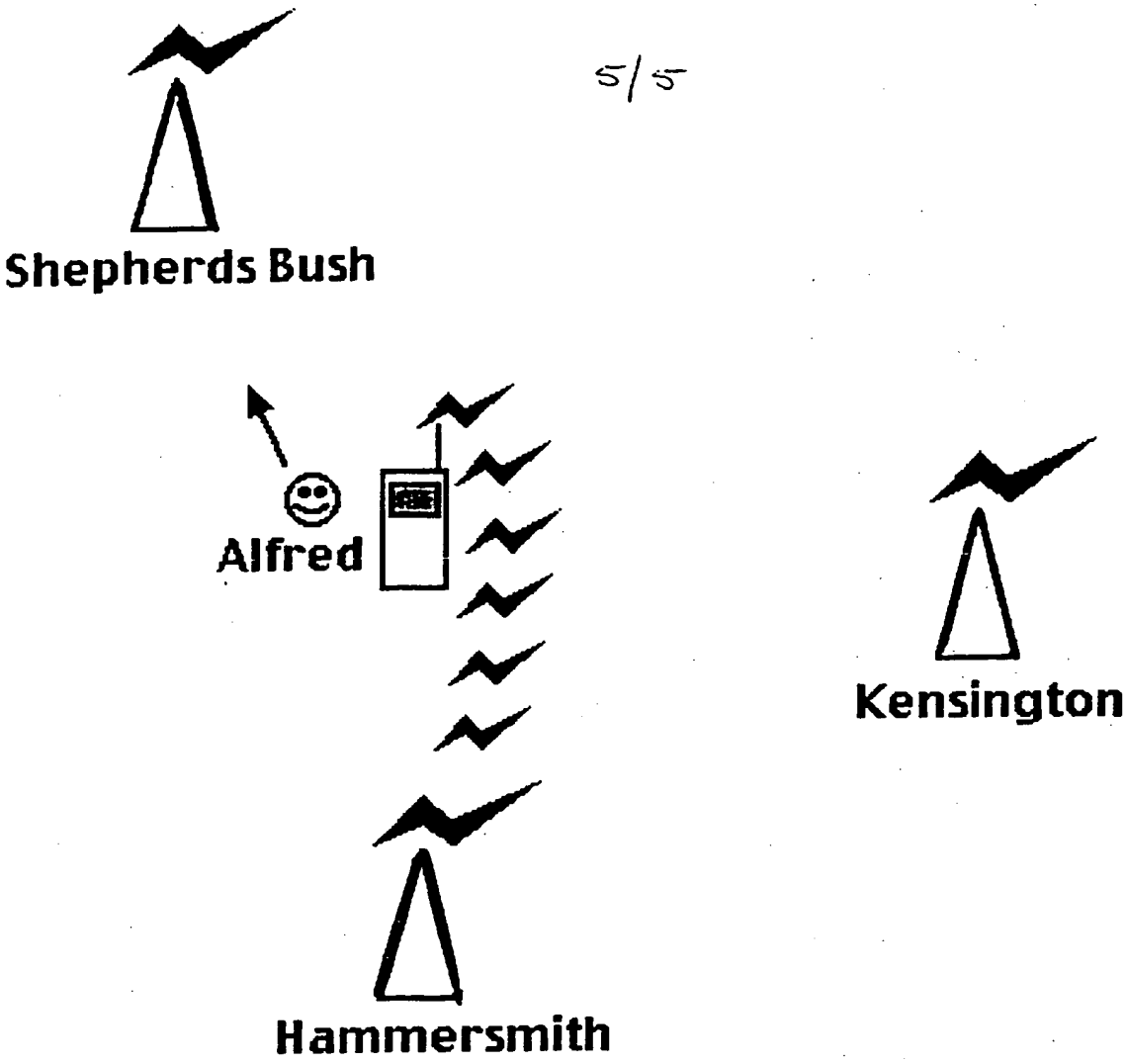

FIG 5

USER TRACKING SYSTEM

The present invention relates to a method of communicating position information via a telecommunication system, and to an apparatus for tracking user position in the telecommunication system.

BACKGROUND OF THE INVENTION

In WO 98/47295, there is described a method of selecting information sources from which information is provided to users via a telecommunications system, said method comprising: tracking the location of a user in the system by receipt of tracking information for said user; accessing location data indicating localities in which information from the respective sources is deemed to be relevant; generating a shortlist of information sources for said user on the basis of said tracking information and said location data; and transmitting said shortlist to a terminal associated with said user so as to allow said user to select an information source of interest and thereby to access information from said source.

While this method allows the access to localised information sources via a terminal such as a mobile phone, if does not allow the user of the terminal to determine his position relative to other users in his proximity. The present invention aims to address this deficit.

SUMMARY OF THE INVENTION

According to one aspect of the present invention, there is provided a method of communicating position information via a telecommunication system, the method comprising: tracking the position of a first mobile communication device associated with a first subscriber to the telecommunication system; accessing position data indicating the presence of a second subscriber to the telecommunication system within a predetermined area of the first mobile communication device, and the position of the second subscriber relative to the position of the first mobile communication device within the predetermined area; and transmitting to the first mobile communication device a signal representative of position information for display by the first mobile communication device, the position information indicating the position of the second subscriber relative to the first mobile communication device within the predetermined area.

According to another aspect of the present invention, there is provided an apparatus for tracking a user position in a telecommunication system, the apparatus comprising: means for storing position data indicative of the position of a first user of the telecommunication system; means for receiving position data indicative of the position of a second user of the telecommunication system; means for detecting the presence of the first user

within a predetermined area of the position of the second user, and the position of the first user relative to the second user within the predetermined area; and means for transmitting a signal representative of position information indicating the position of the second user relative to the position of the first user within the predetermined area.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a schematic illustration of a telecommunications system implementing the user tracking system according to an embodiment of the present invention;

Figure 2 is a flow diagram showing a procedure in the server S of Figure 1;

Figure 3 is a flow diagram showing a procedure in the mobile phone M1 of Figure 1;

Figure 4 is an illustration of a display on the mobile phone M1; and

Figure 5 illustrates location by triangulation of a user "Alfred".

SCENARIO

Alfred, Barbara and Charlie are friends. They like to visit Dunkins, a doughnut chain. But on their various travels, they don't always manage to

keep in touch - and they don't know where the nearest branch of Dunkins is. Barbara has a mobile phone, and Charlie has a Palm Pilot with permanent internet access by radio communications. So Alfred buys himself a mobile phone with a new feature - user tracking - offered by the mobile phone service provider. This is a service which uses software embedded in the phone to show him who is in the vicinity and to make it easy to get in touch. The screen of the phone is illustrated in Figure 4.

Alfred can choose whether or not to display the locations of Barbara, Charlie and Dunkins. They are all 'subscribers' to the user tracking service operated by the mobile phone service provider. If they do not subscribe by default, they could respond to an invitation from another user. But if Charlie does not want his location to be shown to other users of the service, he can 'hide' from the network by sending a signal from his Palm Pilot to the service provider. Dunkins, a commercial enterprise, has paid the service provider to be shown on Personal Radar screens - a handy form of advertising. The private subscribers may be offered the service for free. Although mobile phone users have to buy a new phone, with the software embedded in the phone, Personal Digital Assistant (PDA) users could download the required software through the internet.

OVERVIEW

Software on the user's device - mobile phone or network-linked Personal Digital Assistant, or any other device made for the purpose - alerts the user to the fact that other users are within a certain range. The range could be pre-set, selected by the user, or might vary according to the density of targets. The 'targets' could be people he has selected to receive information about, to either contact or avoid, or commercial enterprises with an interest in signalling their proximity.

The software is arranged to enable a selection of targets from a personal address book or public directory system. Individual users are able to prevent themselves from appearing as targets, and although there is a clear commercial purpose in commercial enterprises appearing as 'targets', these are removable from the user's display selectively either individually or by category.

The software is arranged to provide a radar-style display with range circles and 'blips' for targets that are within range. The user can select these using a cursor and is presented with the option of dialling or messaging them.

The data required to implement the above functionality can be provided via Internet protocols or via a proprietary protocol best suited to the network

provider. Such data can either be managed by the network provider on a client-server approach, or shared on a peer-to-peer basis using a public 'radar protocol'.

Such data - the user's identity and his position - can be gathered by several methods with differing degrees of precision. Any or all of the following could be used:

- The cell location, for cellular systems. With this approach, no further hardware needs to be provided - cellular networks already track the location of each cellular phone in order to route incoming calls. However, in some circumstances, this can yield a very imprecise location, depending on the spatial density of base units in the cellular network, so that additional location tracking may be required.

- Triangulation from neighbouring cells (see Figure 5). This method is easily available to cellular network operators, since they measure the signal strength of any particular phone from the current cell and its neighbouring cells in order to decide when to switch a moving phone from one cell to the next. In Figure 5, user Alfred is travelling from cell 'Hammersmith' to cell 'Shepherds Bush'. About half-way between

the base stations, the Shepherds Bush signal becomes stronger, and the network will switch his access via the new base station.

- Differential radio signals from transmitters at known locations. These may or may not be special beacons; conventional radio stations will often suffice. This requires attaching a broadband receiver to the device (ie the mobile phone or PDA), and embedding a table of frequencies and locations in the device so that it can measure the signal strength from each transmitter and hence calculate its current location.

- GPS, LORAN and/or other specially developed positioning or navigation systems. GPS requires a satellite receiver, which generally requires a clear view of the sky to operate. However, this would be simple to incorporate and would give a very accurate position. The other radio systems in this category require specialised receivers, and function on the same basis as the differential approach detailed above.

- Data input by the user - for instance, by picking a friend's house from an address book, or entering a postal code or grid co-ordinate reference, or picking from a list of venues offered by the software.

Figure 1 schematically illustrates the telecommunications system implementing the user tracking system in accordance with an embodiment of the invention. The telecommunications system comprises a first mobile phone M1 associated with a first subscriber to the user tracking system, and a second mobile phone M2 associated with a second subscriber to the user tracking system. The mobile phones M1, M2 communicate with a Public Land Mobile Network PLMN via base stations B1 and B2, respectively. The PLMN is connected to a server S and a location directory LD. The server S stores software which when executed operates processing means to provide the user tracking functionality as described below. The location directory LD stores data representative of the location of subscribers to the user tracking system.

User Tracking Functionality

In this embodiment of the invention, mobile phones M1 and M2 are each equipped with a global positioning system (GPS) receiver and are arranged to derive their positions periodically. The mobile phones M1 and M2 periodically transmit their respective positions to the server S via the base stations B1 or B2 and the PLMN. However, it is noted that positioning of the mobile phones M1 and M2 can be performed in alternative ways. For example, the mobile phones M1 and M2 could perform positioning using a land-based positioning signal, such as by differential GPS positioning, or

purely using land-based positioning signals, such as differential GSM triangulation signals.

Figure 2 shows a flow diagram illustrating the procedure in the server S upon receipt of data from the mobile phone M2 indicating a new geographical position (step 1). In step 2, the server S effects an update of the location directory so as to reflect the newly received position of the mobile phone M2. In step 3, the server determines whether or not the mobile phone M2 is located within a predetermined distance from the mobile phone M1. In order to do so, the server retrieves the geographical positions of both the mobile phone M1 and the mobile phone M2 from the location directory LD to calculate their distance from one another. If the distance is greater than a preset threshold then the server S takes no further action and returns to its stand-by mode to receive new location data. If the distance is less than the predetermined threshold then the server S causes a signal to be transmitted via the PLMN and the base station B1 to the mobile phone M1, the signal being representative of data indicating the last received geographical position of the mobile phone M2 (step 4).

Figure 3 shows a flow diagram illustrating the procedure followed by the mobile phone M1 upon receipt of data indicating the geographical position of the mobile phone M2 (step 10). In step 11, the processor of the mobile phone

M1 determines whether the user has selected that the position of the mobile phone M2 is displayed on the mobile phone's display (either automatically or upon further selection), or whether this function is suppressed in respect of the mobile phone M2. If the determination is positive (ie the display function is active), then at step 12 the mobile phone M1 is operated to display the position and distance of the mobile phone M2 relative to the current position of the mobile phone M1.

Figure 4 shows an example of how the information pertaining to the location of other subscribers to the user location system can be displayed on the display of the mobile phone M1. In the shown example, the locations of mobile subscribers "Charlie" and "Barbara" are displayed, in addition to the locations of two "Dunkins" shops.

Also, the distances of these users from the location of the mobile phone M1 are displayed. This is achieved by displaying on the mobile phone's screen a number of centred circles, each circle representing a predetermined distance from the location of the mobile phone M1. The centre of the circles corresponds to the location of mobile phone M1.

Accordingly, the display shows a two-dimensional plan of the area in question. The top of the display corresponds to the northward direction,

regardless of the orientation of the mobile phone. However, the mobile phone can be arranged to display additional orientation information on the basis of periodical position updating to derive a movement of the user. Alternatively or additionally, the mobile phone can be provided with a compass to display orientation information.

The user can modify the properties of the display in several ways by selecting the corresponding one of menu options 20 to 24

- to show or hide an individual target on the screen by selecting it using a cursor or scrolling device (menu option 21);

- to show or hide groups of targets, for example a chain of shops which makes its locations public but in which the user has no interest (menu option 21);

- to adjust the range on the display, for example from 200m to 800m, and to send a corresponding signal to the server S about the range he is interested in (menu option 22);

- to alter the centering of the display to take account of his movement, for example if the user is moving northwards and is only interested in

information about the area ahead of him rather than behind or around (menu option 23);

- to make contact with the selected target (menu option 24);

- to show or hide himself from the network, thereby enabling or preventing him from being displayed on other user's displays (menu option 23);

The processing means to implement the above functions resides in the mobile phone. That is, the processing means residing in mobile phones to provide known display functions is adapted to provide the above additional display options on the basis of the data received from the server S as described above.

It should be noted that the present invention is not limited to the embodiment as described above. It is envisaged that various modifications and variations to the above described embodiment could be made without falling outside the scope of the present invention as defined by the claims.

CLAIMS:

1. A method of communicating position information via a telecommunication system, the method comprising:

tracking the position of a first mobile communication device associated with a first subscriber to the telecommunication system.

accessing position data indicating the presence of a second subscriber to the telecommunication system within a predetermined area of the first mobile communcation device, and the position of the second subscriber relative to the position of the first mobile communication device within the predetermined area; and

transmitting to the first mobile communication device a signal representative of position information for display by the first mobile communication device, the position information indicating the position of the second subscriber relative to the first mobile communication device within the predetermined area.

2. The method of claim 1, the method further comprising:

determining the distance between the position of the second subscriber and the position of the first mobile communication device to generate distance information for display by the first mobile communication device.

3. The method of claim 1 or 2, wherein the second subscriber is associated with a second mobile communication device, the method further comprising:

tracking the position of the second mobile communication device; and

storing position data indicative of the position of the second mobile communication device.

4. The method of claim 1 or 2, wherein the second subscriber represents a stationary facility, the method further comprising:

storing position data indicative of the position of the stationary facility.

5. An apparatus for tracking a user position in a telecommunication system, the apparatus comprising:

means for storing position data indicative of the position of a first user of the telecommunication system;

means for receiving position data indicative of the position of a second user of the telecommunication system;

means for detecting the presence of the first user within a predetermined area of the position of the second user, and the position of the first user relative to the second user within the predetermined area; and

means for transmitting a signal representative of position information indicating the position of the second user relative to the position of the first user within the predetermined area.

6. The apparatus of claim 5, wherein the second user is associated with a mobile communication device, and the signal is transmitted by the apparatus for receipt by the mobile communication device.

7. The apparatus of claim 5 or 6, wherein the position information is displayable by the mobile communication device.

8. The apparatus of any of claims 5 to 7, wherein the first user represents a stationary faciltity.

9. The apparatus of any of claims 5 to 7, wherein the first user is associated with a mobile communication device.

10. The apparatus of any of claims 5 to 9, wherein the position information includes information pertaining to the distance of the first user from the second user.

11. A mobile communication system comprising the apparatus of claim 5, and a mobile communication device associated with the second user, the mobile communication device comprising:

a receiver for receiving the signal representative of position information transmitted by the apparatus; and

means for displaying the position information.

12. The mobile communication system of claim 11, wherein the mobile communication device further comprises means for allowing user selection of whether or not to display the position information.

13. A system substantially as described herein by reference to the accompanying drawings.

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Application No: GB 0013795.0 **Examiner:** Anita Keogh
Claims searched: 1-12 **Date of search:** 6 December 2000

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

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Int Cl (Ed.7): G01S (5/00), H04Q (7/22, 7/38)

Other: WPI, JAPIO, EPODOC

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	WO 00/22860 A1	(DEGNBOL) see whole document, especially abstract, page 4 lines 1-21, page 5 lines 16-20, page 6 line 22 to page 7 line 8 page 16 line 32 to page 17 line 10 and figure 1	1-12

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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